A.7 SPACE ASTROPHYSICS RESEARCH AND ANALYSIS (SARA)

1. Scope of Program

The Space Astrophysics Research and Analysis (SARA) program solicits basic research proposals for investigations that are relevant to NASA's programs in astronomy and astrophysics in the wavelength regime greater than approximately 100 Å through the radio spectrum (Laboratory Astrophysics is exempt from wavelength restrictions, as noted below). There are four primary goals: (i) to develop detectors which represent the best possible state-of-the-art detector technology for instruments that may be proposed as candidate experiments for future space flight opportunities; (ii) to develop science investigations whose completion involves the flight of instruments as payloads on suborbital sounding rockets, stratospheric balloons, or longer duration flight opportunities; (iii) to develop supporting technology, perform laboratory research, and conduct ground based observations (see below for restrictions) that are directly applicable to space astrophysics missions; and (iv) to investigate topics in general relativistic and gravitational astrophysics. While excellence of proposed research is the primary selection criterion, relevance to NASA missions is a necessary criterion and must be explicitly described in the proposal. Lists of past, present, and future missions of interest are given in Tables 1 and 2 below, which are furnished only as a guide to assessing relevance of proposals for this Program Element.

Special Considerations: (i) The Laboratory Astrophysics component of the SARA program includes theoretical investigations in the area of "Atomic and Molecular Astrophysics," while an effort to only compile large databases of parameters should be directed to the Applied Information Systems Research Program described in Appendix A.9 of the NRA. (ii) Proposals for ground-based observations will be considered only if they are in direct support of NASA space astrophysics goals, and the proposers are ineligible, by virtue of their institutional affiliation, to receive direct support from the National Science Foundation for ground-based astronomy.

Topics of interest to this SARA program fall into the following six research categories, listed in order of their funding priority:

- *Detector development* – see below for further details;
- *Suborbital* – longer duration flight opportunities include long-duration balloons, Shuttle based carriers, and sounding rocket-class payloads flown as secondary payloads or other flight of opportunities;
- *Supporting technology studies (longward of 100 Å)* - for example, ultra-light holographic/diffraction grating development, thin films, lightweight composite mirrors, spectrometers, interferometers, infrared cameras;

•*Laboratory astrophysics (theoretical or experimental for all wavelengths)* - for example, predissociation in diatomic molecules, electron-ion collisions, compilation of transition probability data, measurement of absolute oscillator strengths, spectroscopic studies of PAH's, investigation of carbon clusters, computation of atomic or molecular parameters;
• *General relativity and physics of gravitation (theoretical proposals should be submitted to the Astrophysics Theory Program A.1.6)*- for example, lunar-laser ranging tests of relativity, low frequency gravitational wave astronomy; and
• *Ground-based astronomy (longward of 100 Å)* - for example, calibration of supergiants for Hubble Space Telescope, development of instrumental or observing techniques.

Detector Development Program

The intent of detector development research solicited here is to understand the fundamental operational aspects of detectors and to develop them to the point where they can be proposed as part of an instrument for future announcements of flight opportunity. Although any detector technology may be proposed to this opportunity, the Next Generation Space Telescope (NGST) project is currently actively supporting detector programs for that mission. Thus, proposals in response to this current NRA would be given a lower priority for developing detectors specifically to achieve NGST detector sensitivity or performance goals.

Considering currently available technology for detectors for space astronomy, the greatest emphasis of this solicitation will be towards those developmental efforts that address the technological problems associated with achieving some of the following desirable detector attributes (not in priority order):

- Increasing quantum efficiency;
- Increasing the array format size;
- Increasing the spatial resolution;
- Increasing the dynamic range (including individual detector elements, as well as the collective response of the detector);
- High speed, high resolution, low noise read-out techniques;
- Reduced detector noise;
- Fabrication and formatting techniques;

- Extending wavelength coverage (e.g., operation of submillimeter and radio receivers at high frequency, increasing instantaneous bandwidth, extending mid-IR detectors to operate either passively or cooled at longer wavelengths, or near-IR detectors to shorter wavelengths); and/or
- Resistance to effects of operation in space.

Since the environment and constraints of space flight are far stricter than those for ground-based applications, research groups considering development of space detectors must be cognizant of the following characteristics that are highly desirable in reliable, space-quality detection systems: low mass, low sensitivity to particle radiation ("radiation hardness"), low power consumption, compactness, ability to operate in an "open face" mode for sensitivity at wavelengths shorter than 1100 Å, designed for operation in a vacuum (such that high voltage arcing is minimized), vibration tolerance, and ease of remote operation, including reduced transient effects and ease of calibration.

New measurement concepts may be proposed, as well as methods to improve the performance of existing detectors. Research into the basic properties of detector systems that could be considered for use in space is also strongly encouraged. It is not , however, the purpose of this solicitation to support development of detectors that are primarily suitable for ground-based astronomy. Observing with ground-based facilities outside the lab for newly-developed detectors may be necessary to verify detector or overall system performance as an integral part of a detector development program, and this case must be made clear in the proposal.

Proposers are asked to identify potential mechanisms that could facilitate transfer of these detector technologies to other users, including the private sector, for possible application beyond the immediate detector development goals.

2. Programmatic Information

It is expected that roughly $ 4.0M will be available in through this NRA for the funding of new projects amongst the six categories: detector development, suborbital, supporting technology, laboratory astrophysics, gravitation and general relativity, and ground-based astronomy. Investigators may propose programs of any size for funding extending up to three years under this solicitation. The actual amount of funding awarded to a particular program will be determined by the merit of the program and programmatic goals of the Office of Space Science. Funding awards will range from one to three years duration.

Currently eleven investigations are being funded for suborbital research for a total of $4.1M, twenty-eight for detector development for a total of $6.0M, and sixty three in the remaining four categories for a total of $4.6M.

While it is recommended that programs proposed span a three-year period, funding limitations may only enable awards of one or two year duration, and it is also recognized that a proposed investigation may evolve with time. Accordingly, emphasis in the proposal should be placed upon the first year's effort, with as much detail as possible on any planned second and third year's activities. Proposals for investigations requiring less than a three-year time scale to complete are encouraged, as are those which require a longer time scale to complete, though the latter must undergo subsequent peer reviews every three years. Key projected milestones and accomplishments during each period of the proposed effort should be identified. The proposals selected will be funded on a yearly basis. For multiyear awards, yearly funding allotments to complete a period of performance after the first year require an Annual Progress Report, which should include a summary sufficient to demonstrate that satisfactory progress has been made.

For the suborbital program, budgets are expected to cover complete suborbital investigations, including payload development and construction, instrument calibration, launch phase, and data analysis. A brief description of the plans for the reduction and analysis of data should be included in the proposal. One goal of the suborbital program is to maintain the continuity of both instrumental expertise and laboratory facilities of research groups specializing in the fields of experimental astrophysics. Hence, the number of groups that can be supported to fly sounding rockets (and other forms of flight opportunity) is limited and heavily dependent on the funds available to this program. NASA does not carry reserves to accommodate any cost overrun incurred by a particular investigation. Such a situation may entail either descoping the initially proposed investigation, or delaying or canceling a particular launch date opportunity.

During the next decade, NASA and the European Space Agency (ESA) expect to launch satellites to explore, in detail, the cosmic microwave background. Consequently, individuals proposing such investigations should endeavor to complete their program within two to four years.

If at all possible, graduate student participation in the detector development program and the suborbital program is strongly encouraged, especially if it can be concluded within the nominal tenure of graduate training. Therefore, brief details of the educational goals and training of such personnel should be included in the proposal.

IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) is now using a single, unified set of instructions for the submission of proposals. This material is contained in the document entitled *OSS Guidebook for Proposers Responding to NASA Research Announcement – 2001* (or "*OSS Guidebook – 2001*" for short) that is accessible by opening "Research Opportunities and Data" from the menu at URL http://spacescience.nasa.gov , or directly at URL http://spacescience.nasa.gov/research/ossguidebook/ . This NRA's *Summary of*

Solicitation also contains the schedule and instructions for the electronic submission of a Notice of Intent (NOI) to propose and a proposal's *Cover Page/Proposal Summary*, for electronic access to the required *Budget Summary* form, and the mailing address for the submission of a proposal.

Questions about this program element may be directed to the following Discipline Scientists:

Dr. Hashima Hasan
Ultraviolet, Visible, and Gravitational Astrophysics Program
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0692
E-mail: hashima.hasan@hq.nasa.gov

Dr. Guy Stringfellow
Infrared, Submillimeter, and Radio Astrophysics Program
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0311
E-mail: guy.stringfellow@hq.nasa.gov

Table 1. Past, Current, and Future NASA Missions Having Objectives for UV, Visible, and Gravitational Astrophysics (see also links through the OSS home page at http://spacescience.nasa.gov)

MISSION	LAUNCH YEAR	REMARKS
• International Ultraviolet Explorer (IUE) 1200–3200Å	1978	Ceased operation.
• Hipparcos	1989	ESA astrometry mission.
• Hubble Space Telescope (HST)	1990	In operation.
Goddard High Resolution Spectrograph (GHRS) 1150–8000Å		Ceased operation.
Faint Object Camera (FOC) 1150–6500Å		Ceased operation.
Faint Object Spectrograph (FOS) 1050–3200Å		Ceased operation.
Wide Field/Planetary Camera 2 (WF/PC2) 1150–11000Å		In operation.
Space Telescope Imaging Spectrograph (STIS) 1150–11000Å		In operation.
• Astro-1	1990	Completed 9 day mission.
• Extreme Ultraviolet Explorer (EUVE) 80–800Å	1992	Ceased operation
• Orbiting and Retrievable Far and Extreme Ultraviolet Spectrometer (ORFEUS)/ Interstellar Medium Absorption Profile Spectrograph (IMAPS) 400–1200Å	1993	Completed 5 day mission.
• Astro-2 400 – 3000 Å	1995	Completed 16 day mission.
• ORFEUS II / IMAPS	1996	Completed 13 day mission.
• On-going tests of relativity	—	Various current interplanetary spacecraft.
• Far Ultraviolet Spectroscopic Explorer (FUSE) 800–1200Å	1999	Operational 3 year mission.
• HST Advanced Camera for Surveys (ACS)	2001	HST replacement instrument.
• Gravity Probe-B (GP-B) -General Relativity	2002	2 year mission.
• The Galaxy Evolution Explorer (GALEX) 1350 – 3000Å	2002	2-1/3 year mission.
• The Cosmic Hot Interstellar Plasma Spectrometer (CHIPS)90 – 260Å	2001	1 year mission.
• Cosmic Origins Spectrograph (COS)	2004	HST replacement instrument.
• Full-Sky Astrometric Mapping Explorer (FAME)	2004	2-1/2 year mission.
• Space Interferometry Mission (SIM)	TBD	Selected for study.

Table 2. Past, Current, and Future NASA Missions Having Objectives in Infrared, Submillimeter, and Radio Astrophysics

MISSION	LAUNCH YEAR	REMARKS
• Hubble Space Telescope (HST)	1990	In operation.
Near Infrared Camera and Multi-object Spectrometer (NICMOS)		Ceased operation.
• Infrared Space Observatory (ISO)	1995	Ceased operation.
• Space Very Long Baseline Interferometry (HALCA)	1996	In operation.
• Submillimeter Wave Astronomy Satellite (SWAS)	1998	In operation.
• Microwave Anisotropy Probe (MAP)	2001	Cosmic microwave background.
• Space Infrared Telescope Facility (SIRTF)	2002	IR Great Observatory.
• Stratospheric Observatory for Infrared Astronomy (SOFIA)	2002	Multipurpose observatory.
• Far Infrared Space Telescope (FIRST)	2007	ESA Cornerstone Mission.
• PLANCK	2007	Cosmic microwave background
• Next Generation Space Telescope (NGST)	2009	Study of Universe at high Z
• Terrestrial Planet Finder	2011	Search for Earth-like planets.

OMB Approval No. 2700-0087

RESEARCH OPPORTUNITIES IN SPACE SCIENCE - 2001
(ROSS-2001)

NASA Research Announcement
Soliciting Basic Research Proposals

NRA 01-OSS-01
Issued: January 26, 2001

Proposals Due
Starting April 6, 2001,
and Ending November 9, 2001

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

RESEARCH OPPORTUNITIES IN SPACE SCIENCE - 2001
(ROSS-2001)

SUMMARY OF SOLICITATION

• INTRODUCTION AND GENERAL POLICIES

The stated mission of the Space Science Enterprise of the National Aeronautics and Space Administration (NASA) is to solve the mysteries of the universe, to explore the solar system, to discover planets around other stars, and to search for life beyond Earth. To carry out this mission, NASA's Office of Space Science (OSS) sponsors a broad range of research programs relevant to its four Science Themes, which are defined as:

- *Astronomical Search for Origins and Planetary Systems* (ASO) that addresses the origins of galaxies, stars, proto-planetary and extra-solar planetary systems, Earth-like planets, and the origin of life;
- *Solar System Exploration* (abbreviated as ESS) that seeks to understand all aspects of our Solar System, including the planets, satellites, small bodies, and solar system materials, and the search for possible habitats of life beyond Earth;
- *Structure and Evolution of the Universe* (SEU) that involves the study of cosmology, the large scale structure of the universe, the evolution of stars and galaxies, including the Milky Way and objects with extreme physical conditions, and an examination of the ultimate limits of gravity and energy in the Universe; and
- *The Sun-Earth Connection* (SEC) that concerns the Sun as a typical star and as the controlling agent of the space environment of the Solar System, especially the Earth.

Stated informally, these four themes seek to answer four fundamental questions, "How did the Universe begin and evolve?" "Where did we come from?" "Where are we going?" and "Are we alone?" Further information about these themes as well as access to the most recent Strategic Plans (as of late 2000) for both NASA and OSS may be found through the OSS homepage on the World Wide Web at http://spacescience.nasa.gov . In addition, this NRA may be found through the menu listings "*Research Opportunities and Data/OPEN Opportunities*" at this same Web site.

OSS pursues these fundamental science themes using a wide variety of both space flight programs and investigations in basic science and technology. This current NASA Research Announcement (NRA) ROSS-2001 solicits proposals for Supporting Research and Technology (SR&T) investigations that seek to understand naturally occurring space phenomena and space science-related technologies across a full range of science subdisciplines relevant to OSS interests. These program elements are listed in the index to Appendix A at the

end of this Summary of Solicitation. Table 1 lists these program elements in the order of their respective due dates for the submission of proposals, while Table 2 lists them in according to their order shown in Appendix A. As a guide to their relationships, Tables 1 and 2 also cross references these program elements to the OSS Science Themes as noted above. Appendix A contains detailed descriptions of each element, and questions about each may be directed to their respective Discipline Scientists who are identified in the section entitled "Programmatic Information" that concludes the description of each program element.

Beginning with the ROSS NRA issued in February 2000 (NRA 00-OSS-01), the program elements offered through this series of solicitations have been grouped into nine "clusters" as indicated in the Table of Contents of Appendix A at the end of this Summary of Solicitation. It is a goal to group the due dates for proposals for the program elements within each cluster closely together in time to allow for the possibility of the reallocation of funding within a cluster once all its related proposals are reviewed. In addition, recommendations from a comparative review of all clusters in mid-2001 will be used to help determine the cluster structure and content, as well as funding allocations for Fiscal Year's 2002-2004 (October 1, 2001, through September 30, 2003). Questions about this evolving approach to the structure and review of the OSS SR&T program may be sent to:

Dr. Guenter R. Riegler
Director
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546-0001
Telephone: 202-358-1588
E-mail: guenter.riegler@hq.nasa.gov
Facsimile: 202-358-3097

Although Tables 1 and 2 effectively cross-references these newly defined clusters to many of the traditional ROSS Program Elements and the four OSS Science Themes, the section entitled "INTRODUCTION AND OVERVIEW" of Appendix A also provides additional narrative material that expands on these relationships. Therefore, anyone interested in applying to this NRA is urged to read the relevant parts of this introductory section to Appendix A for a full understanding of whether their research interests are relevant to NASA OSS interests, and, if so, to which cluster and program element their proposal should be submitted. It is especially important to note that the overall objective of each of these program elements to contribute as effectively and directly as possible to the achievement of OSS strategic goals. Therefore, priority for selection will be given to those proposals that most clearly demonstrate the potential for making such contribution (see also the discussion of the evaluation criteria below).

Recommendations for funding for the proposals submitted to this NRA will be based on the peer evaluation of each proposal's intrinsic merit, its relevance to NASA's objectives, and its cost. For the purposes of this NRA: (i) by intrinsic merit is meant the proposal's science and technical merits, the capabilities of the proposing institution, the qualifications of the proposing personnel, and the overall standing of the proposal among similar proposals and/or evaluation against the state-of-the-art; (ii) by relevance to NASA's objectives is meant the proposal's relevance to the objectives of the OSS science program element as described in this NRA to which the proposal is submitted; and (iii) by cost is meant the reasonableness and realism of the proposal's requested budget, in addition to its size. In all cases, the Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment can be made and upon the receipt of proposals in response to this NRA that NASA determines are acceptable for award.

Participation in this program is open to all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit institutions, NASA Centers, and other Government agencies. Historically Black Colleges and Universities (HBCU's), other minority educational institutions, and small businesses and organizations owned and controlled by socially and economically disadvantaged individuals or women are particularly encouraged to apply. Participation by non-U.S. organizations in this program is encouraged subject to NASA's policy of no-exchange-of-funds (see further information in the "*OSS Guidebook for Proposers…*" discussed below).

• NEW INSTRUCTIONS FOR PREPARATION/SUBMISSION OF PROPOSALS

Starting in 1998, the Office of Space Science began to use a single, unified set of instructions for the submission of proposals for almost all of its NRA's that were incorporated into each NRA. Such standardization has proven to be of significant value to NASA to help ensure the uniform handling and processing of submitted proposals, as well as to researchers interested in responding to multiple program elements within the ROSS NRA's, or even different OSS NRA's. However, starting with this ROSS-2001 NRA, these proposal policies and procedures, as well as those for NASA's review and selection of proposals for funding, are now described in a separate document entitled "*Office of Space Science (OSS) Guidebook for Proposers Responding to NASA Research Announcement – January 2001*" (abbreviated as "*OSS Guidebook – 2001*") that is accessible by opening "*Research Opportunities and Data*" from the menu at the World Wide Web URL http://spacescience.nasa.gov, or may be directly accessed at URL http://spacescience.nasa.gov/research/ossguidebook/.

By reference, this *OSS Guidebook – 2001* is hereby incorporated into this ROSS–2001 NRA, and proposers to this NRA are responsible for understanding and complying with its procedures before preparing and submitting their proposals. In particular, its Chapter 2 ("Proposal Preparation and Organization") and Chapter 3 ("Proposal Submission Procedures") largely

replace the contents of "Chapter C" in most OSS NRA's issued during the previous three years. Proposers familiar with these past OSS NRA's will find that these instructions are essentially unchanged from those introduced starting in 1998. Also, note that the NASA-required proposal *Budget Summary* form is now available electronically through the Web site designated for the *Cover Page/Proposal Summary* (see Summary Information below) for printing in hard copy for submission with the hard copies of the proposal. The other chapters and appendices of this *OSS Guidebook – 2001* provide supplemental information about the entire NRA process, including NASA policies for the solicitation of proposals (including those involving non-U.S. participation), guidelines for writing complete and effective proposals, the NASA policies and procedures for the proposal review and selection processes, and for issuing and managing the awards to the institutions that submitted selected proposals, and Frequently Asked Questions (FAQ's) about a variety of proposal and award processes and procedures.

Comments and suggestions of any nature about this *OSS Guidebook – 2001* are encouraged and welcomed and may be directed at any time to Dr. David Bohlin, Research Program Management Division, Code SR, Office of Space Science, NASA Headquarters, Washington, DC 20546-0001; telephone: (202) 358-0880; E-mail: david.bohlin@hq.nasa.gov (if submitted by E-mail, use "Proposer's Guidebook" as the Subject of the message).

The World Wide Web site for submitting both a Notice of Intent (NOI) to propose and a proposal's *Cover Page/Proposal Summary* is given in the Summary Information below (Chapters 2 and 3 of the *OSS Guidebook – 2001* as discussed above contains detailed information about these two items). This Web site will be open for the submission of NOI's for any given program element in this NRA for typically 30 days, starting about 90 days before the proposal due date, and the site will be open for the submission of the other required proposal materials starting about 45 days before the proposal due date (see Tables 1 and 2 below for all schedules). A point of contact for assistance in accessing and/or using this Web site is given in the Summary Information below.

- OSS EDUCATION AND PUBLIC OUTREACH (E/PO) PROGRAM

OSS policy continues to strongly encourage participation by the space science community in education and public outreach activities with the goal of enhancing the Nation's formal education system and contributing to the broad public understanding of science, mathematics, and technology. A significant national program in space science education and outreach is now underway, and OSS's demonstrated contributions to education and outreach have now become an important part of the broader justification for the public support of space science (for further details open "*Education and Public Outreach*" on the OSS homepage at http://spacescience.nasa.gov).

Since 1998 when it started to offer the opportunity to propose E/PO activities in conjunction with its NRA's, the Office of Space Science has received many constructive comments from

members of the space science community as to how to improve its efforts to involve space scientists in education and public outreach. Based on the experience of the past few years and these comments, OSS is making a number of important changes in procedure this year. In particular, starting with this OSS ROSS-2001 NRA, E/PO proposals will be solicited only from those proposers whose research proposals have been already selected for an award. This change should decrease the overall workload on the space science community, increase the likelihood that more E/PO proposals of merit will be funded, and more effectively encourage successful science proposers to add an E/PO component to their research effort.

Therefore, only those proposers to this NRA who are eventually selected on the basis of the excellence of their research awards will be eligible to propose a supplemental E/PO program in accord with the OSS E/PO policies and guidelines. At the time of the release of this NRA it is anticipated that selected Principal Investigators will have two windows of opportunity to submit an E/PO proposal, either: (i) no later than 45 days after the date of the letter of selection of their parent research proposal, with the anticipation of starting the proposed E/PO activity within the first third of the first year of parent research award; or (ii) no later than 75 days before the yearly anniversary date of their award, with the anticipation of starting the proposed E/PO activity in conjunction with next yearly funding supplement of their multiple year award. In either case, consistent with the past E/PO policies and to ease the burden of NASA's administration of these supplemental awards, the total period of performance of an E/PO award will be restricted to that of its parent research award.

The current description of the underlying strategy and implementation plans for the OSS E/PO program may be found through the menu item *Education and Public Outreach* on the OSS homepage at http://spacescience.nasa.gov. The specific policies and procedures for writing and submitting supplemental E/PO proposals in conjunction with proposals selected through this NRA will be posted no later than the end of July 2001, which will be sufficiently early to allow those selected for the program elements with the earliest proposal due dates (see Table 1 below) to organize and submit an E/PO proposal. Questions and/or comments about this OSS E/PO program are sincerely welcomed and may be directed to Dr. David Bohlin, Research Program Management Division, Code SR, Office of Space Science, NASA Headquarters, Washington, DC 20546-0001 (telephone: 202-358-0880; E-mail: david.bohlin@hq.nasa.gov)

- ITEMS OF SPECIAL IMPORTANCE FOR THIS NRA

(1) Because this ROSS-2001 NRA is being released far in advance of many of the deadlines given in Tables 1 or 2, additional programmatic information for any given entry may develop before proposals are due. If so, such material will be added as an Amendment to this NRA as posted at its NRA Web site no later than 30 days before the proposal deadline. Although NASA OSS will also send an electronic alert of any such amendments to all subscribers of its electronic notification system (see Special Note (3) below), it is the

responsibility of prospective proposers to check this NRA Web site for updates concerning the program element(s) and/or cluster(s) of interest.

(2) OSS now requires the electronic submission of certain key elements of proposals through the World Wide Web (see below in the Summary Information), and this practice continues with this NRA. While every effort is made to ensure the reliability and ease of accessibility of this Web site, and to maintain a point of contact for assistance via E-mail, difficulty in accessing and/or using this site may arise at any point on the Internet including the user's own equipment. Therefore, prospective proposers are urged to familiarize themselves with this site and to submit the required proposal materials well in advance of the deadline(s) of the program element(s) of interest.

(3) OSS maintains an electronic notification system to alert interested subscribers of the impending release of its research program announcements. Subscription to this service is accomplished through the menu item *Get E-mail Announcements* on the OSS home page at http://spacescience.nasa.gov by following the instructions for *Space Science Research Announcements*. Owing to the increasingly multidisciplinary nature of OSS programs, this electronic service will notify subscribers of all future NASA OSS program announcements regardless of its type and objective (10 to 15 per year). Regardless of whether this service is subscribed to or not, all OSS research announcements may be accessed from the Web as soon as they are posted (about 8:30 a.m. Eastern Time on the day of release) through *Research Opportunities and Data* on the OSS homepage.

- SUMMARY INFORMATION APPLICABLE TO THIS NRA

- Program alphanumeric identifier: NRA 01-OSS-01

- Date of NRA issue: January 26, 2001

- Guidance for preparation and submission of proposals:

  "*OSS Guidebook for Proposers – 2001*" at URL
  http://spacescience.nasa.gov/research/ossguidebook/

- Submission of *Notice of Intent* (NOI) to propose:

  - Due date: See Table 1 or 2 below for program element of interest (typically 60 days prior to the Proposal Deadline)

  - Web site for electronic submission: http://props.oss.hq.nasa.gov (contact for help: deb.tripp@hq.nasa.gov)

- Electronic submission of the proposal's *Cover Page/Proposal Summary*:

  - Deadline: See Table 1 or 2 below for program element of interest.

  - Web site for electronic submission: http://props.oss.hq.nasa.gov (open for submissions starting about 45 days in advance of proposal due date for each program element; (contact for help: deb.tripp@hq.nasa.gov)

- Web site for download of proposal *Budget Summary* form:

  http://props.oss.hq.nasa.gov
  (contact for help: deb.tripp@hq.nasa.gov)

- Submission of hard copy of proposals:

  - Page limits: Default values are given in Section 2.3 of "*OSS Guidebook – 2001*" (unless otherwise specified in Appendix A of this NRA).

  - Required number: Signed original plus 15 copies (unless otherwise specified in Appendix A of this NRA).

  - Deadlines: 5 p.m. Eastern Time on dates in Table 1 or 2 below.

- Address for submission by US Postal Service, commercial delivery, or courier:

Name of Program Element
ROSS-2001 NRA
NASA Peer Review Services
Suite 200
500 E Street, SW
Washington, DC 20024
Telephone: (202) 479-9030

- Selecting Official: Director or Deputy Director
  Research Program Management Division
  Office of Space Science

- Announcement of selections: Goal: 150 days after proposal due date.

- Initiation of funding for new awards: Goal: 46 days after proposal selection.

- Further information:

  - Specific science program elements: Discipline Scientist listed for each program element in Appendix A.

  - General NRA policies and procedures: Dr. David Bohlin
    Research Program Management Division
    Code SR
    Office of Space Science
    National Aeronautics and Space Administration
    Washington, DC 20546-0001
    Phone: (202) 358-0880
    E-mail: david.bohlin@hq.nasa.gov

Your interest and cooperation in responding to this ROSS-2001 NRA are appreciated. Comments about the inclusive nature and/or structure of this NRA for the OSS supporting research and analysis programs are welcome and may be directed to either the Discipline Scientists identified for each program element in Appendix A or to the point of contact for General NRA Procedures identified above.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe

Jay Bergstralh
Acting Science Program Director
Solar System Exploration

Anne L. Kinney
Science Program Director
Astronomical Search for Origins
and Planetary Systems

George L. Withbroe
Science Program Director
The Sun-Earth Connection

APPENDIX A. DESCRIPTION OF PROGRAM OPPORTUNITY Page

TABLE 1

SCIENCE PROGRAM ELEMENTS SOLICITED IN THE ROSS-2001 NRA
(in order of the proposal due dates)

Cluster	NRA Appendix	Science Program Element (see Appendix A)	NOI Due Date	Proposal Due Date	Relevant OSS Science Themes [1]			
					ASO	SEU	ESS	SEC
A.8	A .8.1	X-ray and Gamma-ray Astrophysics	2/23/01	4/06/01		X		
A.8	A.8.2	Cosmic Ray Astrophysics	2/23/01	4/06/01		X		
A.1	A.1.2	Sun-Earth Connection Guest Investigator	2/23/01	4/20/01				X
A.5	A.5.3	Planetary Atmospheres [2]	2/23/01	4/20/01			X	
A.5	A.5.4	Planetary Suborbital Research	2/13/01	4/20/01			X	
A.1	A.1.1	Sun-Earth Connection Theory	3/02/01	4/27/01				X
A.1	A.1.4	Astrophysics Data	3/02/01	5/04/01	X	X	X	
A.1	A.1.5	Long-Term Space Astrophysics	3/02/01	5/04/01	X	X	X	
A.4	A.4.2	Planetary Geology and Geophysics [2]	3/09/01	5/10/01			X	
A.4	A.4.1	Cosmochemistry [2]	3/23/01	5/18/01	X		X	
A.4	A.4.3	Origins of Solar Systems	3/30/01	6/01/01	X		X	
A.5	A.5.1	Planetary Astronomy [2]	4/13/01	6/15/01	X		X	
A.5	A.5.2	Near Earth Object Observations	4/13/01	6/15/01	X		X	

A.7	A.7	Space Astrophysics Research and Analysis [3]	4/06/01	6/21/01	X	X		
A.3	A.3	Geospace Sciences [4]	5/02/01	6/22/01			X	X
A.1	A.1.6	Astrophysics Theory	5/25/01	7/20/01	X	X		
A.6	A.6.1	Exobiology [2]	6/08/01	8/03/01	X		X	
A.6	A.6.2	Planetary Instrument Definition and Development	6/07/01	8/08/01			X	
A.2	A.2	Solar and Heliospheric Physics	6/22/01	8/24/01				X
A.4	A.4.4	Mars Data Analysis	7/06/01	8/31/01			X	
A.1	A.1.3	Living With a Star Targeted Research and Technology	7/18/01	9/19/01				X
A.9	A.9.1	Applied Information Systems Research	7/27/01	9/26/01	X	X	X	X
A.5	A.6.4	Astrobiology Science and Technology	9/14/01	11/09/01	X		X	
A.6	A.6.3	Planetary Major Equipment [2]	See ESS Element of	Program interest. [2]	X		X	
A.5	A.4.5	Discovery Sample Return Lab. Instruments and Data Analysis	TBD	TBD	X		X	

[1] ASO: Astronomical Search for Origins; SEU: Structure and Evolution of the Universe; ESS: Solar System Exploration; SEC: The Sun-Earth Connection.
[2] The proposals for Planetary Major Equipment program element A.6.3 may be submitted in conjunction with program elements A.4.1: Cosmochemistry; A.4.2: Planetary Geology and Geophysics; A.5.1: Planetary Astronomy; A.5.3: Planetary Atmospheres; and A.6.1 Exobiology.
[3] The Space Astrophysics Research and Analysis cluster includes the following program elements that were separately identified in the ROSS-1998 and -1999 NRA's: Ultraviolet, Visible, and Gravitational Astrophysics; Infrared/Submillimeter/Radio/Interferometry Astronomy; Space Astrophysics Detectors; and Astrophysics Suborbital.
[4] The Geospace Sciences cluster includes the following program elements that were separately identified in previous ROSS-1998 and -1999 NRA's: Ionospheric, Thermospheric, and Mesospheric (ITM) Physics; Magnetosphere Physics; and Magnetospheric and ITM Low Cost Access to Space.

TABLE 2

SCIENCE PROGRAM ELEMENTS SOLICITED IN THE ROSS-2001 NRA
(in order of NRA Table of Contents)

Cluster	NRA Appendix	Science Program Element (see Appendix A)	NOI Due Date	Proposal Due Date	Relevant OSS Science Themes [1]			
					ASO	SEU	ESS	SEC
A.1	A.1.1	Sun-Earth Connection Theory	3/02/01	4/27/01				X
A.1	A.1.2	Sun-Earth Connection Guest Investigator	2/23/01	4/20/01				X
A.1	A.1.3	Living With a Star Targeted Research and Technology	7/18/01	9/19/01				X
A.1	A.1.4	Astrophysics Data	3/02/01	5/04/01	X	X	X	
A.1	A.1.5	Long-Term Space Astrophysics	3/02/01	5/04/01	X	X	X	
A.1	A.1.6	Astrophysics Theory	5/25/01	7/20/01	X	X		
A.2	A.2	Solar and Heliospheric Physics	6/22/01	8/24/01				X
A.3	A.3	Geospace Sciences [4]	5/02/01	6/22/01			X	X
A.4	A.4.1	Cosmochemistry [2]	3/23/01	5/18/01	X		X	
A.4	A.4.2	Planetary Geology and Geophysics [2]	3/09/01	5/10/01			X	
A.4	A.4.3	Origins of Solar Systems	3/30/01	6/01/01	X		X	
A.4	A.4.4	Mars Data Analysis	7/06/01	8/31/01			X	
A.5	A.4.5	Discovery Sample Return Lab. Instruments and Data Analysis	TBD	TBD	X		X	

A.5	A.5.1	Planetary Astronomy [2]	4/13/01	6/15/01	X		X	
A.5	A.5.2	Near Earth Object Observations	4/13/01	6/15/01	X		X	
A.5	A.5.3	Planetary Atmospheres [2]	2/23/01	4/20/01			X	
A.5	A.5.4	Planetary Suborbital Research	2/13/01	4/20/01			X	
A.6	A.6.1	Exobiology [2]	6/08/01	8/03/01	X		X	
A.6	A.6.2	Planetary Instrument Definition and Development	6/07/01	8/08/01			X	
A.6	A.6.3	Planetary Major Equipment [2]	See ESS Element of	Program interest. [2]	X		X	
A.5	A.6.4	Astrobiology Science and Technology	9/14/01	11/09/01	X		X	
A.7	A.7	Space Astrophysics Research and Analysis [3]	4/06/01	6/21/01	X	X		
A.8	A.8.1	X-ray and Gamma-ray Astrophysics	2/23/01	4/06/01		X		
A.8	A.8.2	Cosmic Ray Astrophysics	2/23/01	4/06/01		X		
A.9	A.9.1	Applied Information Systems Research	7/27/01	9/26/01	X	X	X	X

[1] ASO: Astronomical Search for Origins; SEU: Structure and Evolution of the Universe; ESS: Solar System Exploration; SEC: The Sun-Earth Connection.
[2] The proposals for Planetary Major Equipment program element A.6.3 may be submitted in conjunction with program elements A.4.1: Cosmochemistry; A.4.2: Planetary Geology and Geophysics; A.5.1: Planetary Astronomy; A.5.3: Planetary Atmospheres; and A.6.1 Exobiology.
[3] The Space Astrophysics Research and Analysis cluster includes the following program elements that were separately identified in the ROSS-1998 and -1999 NRA's: Ultraviolet, Visible, and Gravitational Astrophysics; Infrared/Submillimeter/Radio/Interferometry Astronomy; Space Astrophysics Detectors; and Astrophysics Suborbital.
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